LOW SHRINKAGE TAPE JOINT COMPOSITION CONTAINING ATTAPULGITE

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of copending application Ser. No. 876,753, filed June 20, 1986 now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to tape joint compounds and spachtling (or spackling) compounds and is especially concerned with compositions having low shrinkage upon drying.

During installation, gypsum board surfaces frequently develop cracks, pits, etc. When gypsum board is mounted, there are inevitably dimples at the location where individual sheets are nailed or screwed to studs or ceiling joists. A strip of perforated tape is commonly applied over the indented adjacent edges of a space between adjoining gypsum board panels, spreadable joint filling composition (commonly called "compound") being applied both under and over the tape and allowed to dry or cure.

Even if the original gypsum board or plaster installation is substantially free of defects, shrinkage or uneven settling is likely to cause cracks at a later time. When pictures are moved from one location to another, nail holes remain at the first location. Flaws of these type are typically repaired with spachtling compound, which is a spreadable composition that is similar to, but somewhat "dryer" than, tape joint compound, which is applied and similarly allowed to dry or cure.

Both tape joint compounds and spachtling compounds include polymeric binder, filler, and water, but also typically include preservatives, water-retention agents, wetting agents, defoamers, plasticizers, non-leveling agents, etc. The density of such compositions can be reduced by incorporating expanded perlite or hollow glass microspheres, the latter sometimes being referred to as glass microbubbles; see, e.g., U.S. Pat. Nos. 3,183,107, 3,386,223, 4,086,098, 4,391,647, and 4,454,267.

Because it is necessary for tape joint compositions to include enough water to permit them to be readily and smoothly applied with a spatula or trowel, a substantial amount of shrinkage typically results during drying. It is thus generally necessary to apply such compositions in several separate thin coats, sanding at least after the last coat has dried, in order to avoid leaving a disfiguring depression where the joint has been filled. For example, when filling taped joints between abutted gypsum board panels, it is usually necessary to apply three coats of a joint filling composition having a shrinkage of 30–40%, drying and preferably sanding between applications. Certain premium compositions having a shrinkage of 20–30% may require only two applications, but it is believed that no previous composition would yield satisfactory results in a single application. Since all joint filling operations are highly labor intensive (typically labor costs amount to about 90% of the cost of the project), the total cost has been extremely high when compared to the cost of the composition employed, and the advantages of a one-pass compound appear to be obvious. Interestingly, however, both manufacturers and purchasers profess to be extremely concerned about the cost of the compositions, and no such one-pass compound has been available; indeed, it is believed that no one recognized how to make such a composition.

Manufacturers of joint filling compositions formerly included asbestos fibers to impart the non-sagging properties considered essential to a successful product. When asbestos was recognized as a carcinogen, manufacturers turned to more innocuous substitutes to impart the same properties. In the absence of asbestos, attapulgite (a micronized swelling or gelling clay having a fibrous crystalline structure and a high oil absorbence; cf. U.S. Pat. Nos. 3,907,725 and 4,454,627), thickeners (e.g., cellulose ethers such as hydroxypropyl methyl cellulose or hydroxyethyl cellulose; cf. U.S. Pat. No. 4,454,627; starch; precipitated or fumed silica), and adjuvants such as gelling agents and flow control agents became typical ingredients in joint filling compositions. These additives—especially the attapulgite and cellulose ethers, which adsorb a substantial amount of water and impart thixotropic and non-sagging properties to the finished composition and which are present in substantial amounts—unfortunately have also made it impossible to achieve a spreadable composition having low water content. As a result, prior art compositions have been subject to significant shrinkage (up to about 50%), making it necessary to apply more than one coat (typically three coats, as previously noted) to achieve an acceptable appearance.

SUMMARY OF THE INVENTION

The present invention provides joint filling compositions that have extremely low shrinkage while still possessing desirable attributes of easy application and resistance to sagging. Satisfactory filling can be effected in two applications, and often in a single application, dramatically reducing labor cost. Because the compositions of the invention contain a higher volume percentage of relatively high density solid material than prior art compositions, the weight per unit volume of the least expensive compositions is somewhat higher; density can, of course, be reduced by incorporating hollow fillers such as expanded perlite or, preferably, hollow glass microspheres, as part of the solid material, albeit at some increase in the cost of raw materials.

The present invention is based on the deceptively simple discovery that prior art joint filling compositions can be significantly improved and shrinkage drastically reduced by minimizing the volume percentage of water-adsorbing additives such as the conventionally included attapulgite and hydroxyethyl cellulose, thereby obtaining compositions having lower water content than has heretofore been considered possible. Although the shrinkage is reduced, the handling and non-sagging properties of the prior art compositions are retained. Simple and logical though the invention may seem in retrospect, it flies in the face of what has been "known" by those skilled in the art.

Compositions of the invention exhibit shrinkage upon drying of no more than about 25%, preferably no more than about 20%, and still more preferably no more than about 10%. This decreased shrinkage significantly reduces the need for additional coatings, even where the area to be filled is deep or extensive, and thereby greatly lowers labor cost.

Compositions of the present invention are significantly more nearly Newtonian than those of the prior art. If, for example, viscosity is measured at room temperature on a Brookfield Model RVT Viscometer using